

A Report for

DYFED ARCHAEOLOGICAL TRUST

on a

Geophysical Survey

carried out at

PEMBROKE POWER STATION

September 1995

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INTRODUCTION

This geophysical survey was commissioned as part of the archaeological evaluation of land adjacent to Pembroke Power Station prior to the commencement of a proposed construction project.

DESCRIPTION OF THE SITE

The site lies to the north-west of Pembroke Power Station (OS Ref. SM 924 031) on soils that are well drained and derived from drift over Palaeozoic limestone. The ground at the time of the survey (25-28 September 1995) had been ploughed, and the weather was wet and windy.

The site was identified for geophysical survey due to the possible existence of an enclosure 85m in diameter seen only once as a weak crop mark in an aerial photograph (see Figure 3).

METHODOLOGY

The single technique of magnetometry was used on this site and is described briefly below.

Magnetometer

Although the changes in the magnetic field resulting from differing features in the soil are usually weak, changes as small as 0.2 nanoTesla (nT) in an overall field strength of 48,000nT, can be accurately detected using an appropriate instrument.

The mapping of the anomaly in a systematic manner will allow an estimate of the type of material present beneath the surface. Strong magnetic anomalies will be generated by buried iron-based objects or by kilns or hearths. More subtle anomalies such as pits and ditches can be seen if they contain more humic material which is normally rich in magnetic iron oxides when compared with the subsoil.

To illustrate this point, the cutting and subsequent silting or backfilling of a ditch may result in a larger volume of weakly magnetic material being accumulated in the trench compared to the undisturbed subsoil. A weak magnetic anomaly should therefore appear in plan along the line of the ditch.

The magnetic survey was carried out using an FM36 Fluxgate Gradiometer, manufactured by Geoscan Research. The instrument consists of two fluxgates mounted 0.5m vertically apart, and very accurately aligned to nullify the effects of the earth's magnetic field. Thus readings relate to the difference in localised magnetic anomalies compared with the general magnetic background. Readings are taken automatically with a sample trigger and held in an 'on board' data logger. The data is later downloaded into a computer for processing and presentation.

Processing can emphasise various aspects contained within the data but which are often not easily seen in the raw data. Basic processing of the magnetic data involves 'flattening' the background levels with respect to adjacent traverses and adjacent

grids. 'Despiking' is also performed to remove the anomalies resulting from small iron objects often found on agricultural land. Once the basic processing has flattened the background it is then possible to carry out low pass filtering to reduce 'noise' in the data and hence emphasise the archaeological or man-made anomalies. The presentation of the data for the site involves a print-out of the raw data both as grey scale and trace plots, together with grey scale plots of the "flattened" and despiked data, and, if appropriate, after further processing to emphasise various aspects within the data.

Magnetic features have been identified and plotted onto the 'Abstraction of Anomalies' drawing for the site (Figure 6), numbered for ease of reference and prefixed with the letter 'M'.

DISCUSSION

Figure 7 shows where the possible crop mark lies in relation to the anomalies found in the survey. It is evident that the crop mark has not been found by the geophysics. However a number of other anomalies were found and are discussed below.

The large magnetic anomaly M1 in the northern part of the site is the most dominant feature found. It may be associated with the small adjacent anomaly M8 to the west. It is difficult to interpret this anomaly as it is over 10m in diameter and positive in nature. This would suggest a large pit filled with a magnetic material.

There are several interesting linear anomalies, in particular M2, M3 and M4. These are positive rectilinear/curvilinear anomalies which have the appearance of old field boundaries. M5 is a rectilinear feature joining the curvilinear feature M3 tangentially.

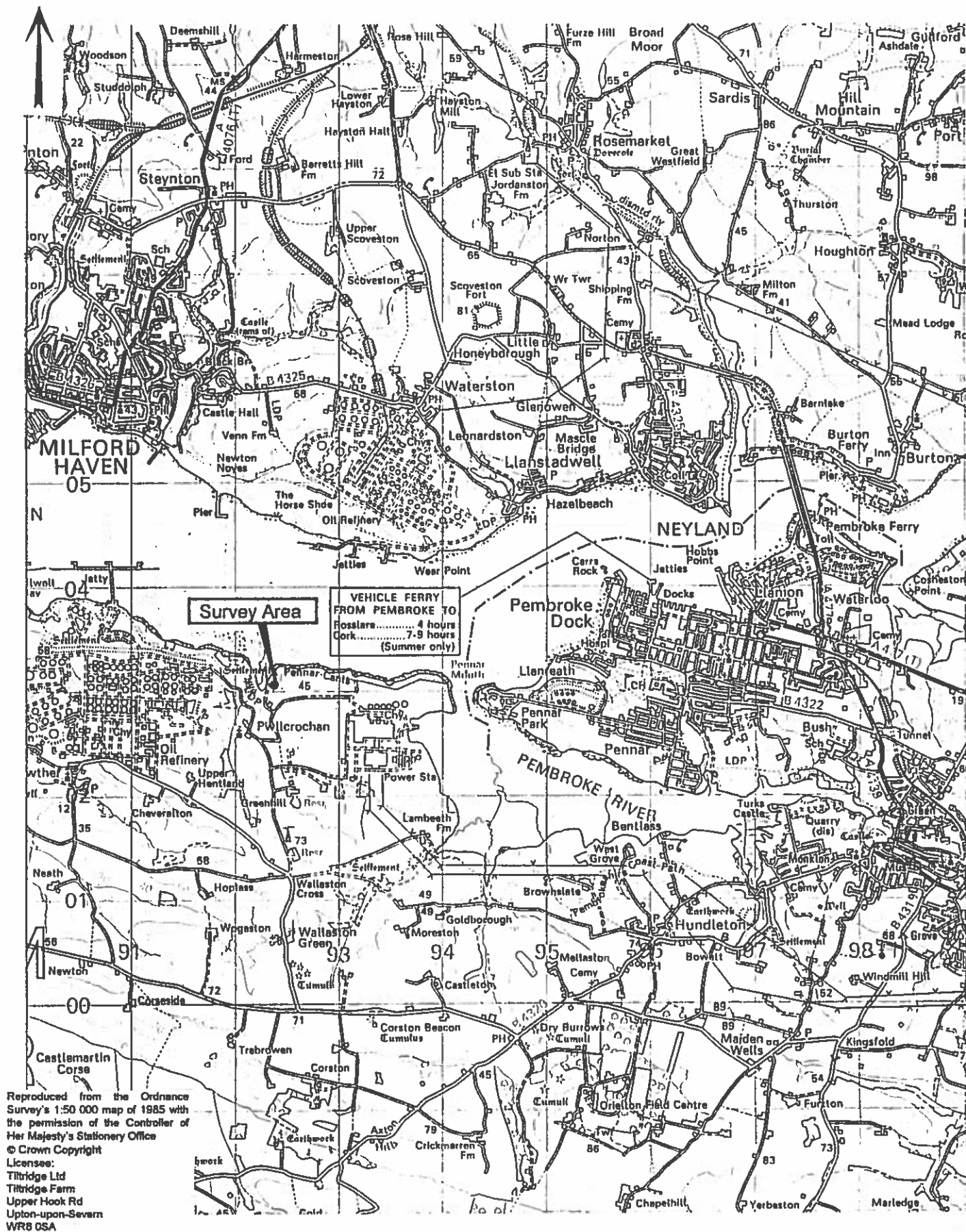
There are a number of other smaller anomalies. M6 and M7 are both weak rectilinear anomalies which join M4 at right angles and run out of the survey area. M14 and M15 are weak linear features to the west of M4. There are also several anomalies such as M8, M9, M10, M11, M12 and M14 which may be pits and therefore may be worthy of further investigation.

There is a noticeable 'stippling' effect across the south-eastern part of the site which is probably natural in origin.

CONCLUSION

The geophysical survey has failed to confirm the presence of the cropmark seen in an aerial photograph. There is evidence of ploughed out field boundaries and other shorter linear features which may possibly be of archaeological interest.

The strong circular anomaly in the north of the site is worthy of investigation as it may be archaeological rather than modern in origin. Similarly it would be prudent to investigate some of the smaller discrete features which may be pits.



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Client

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Scale 1:50 000

Subject

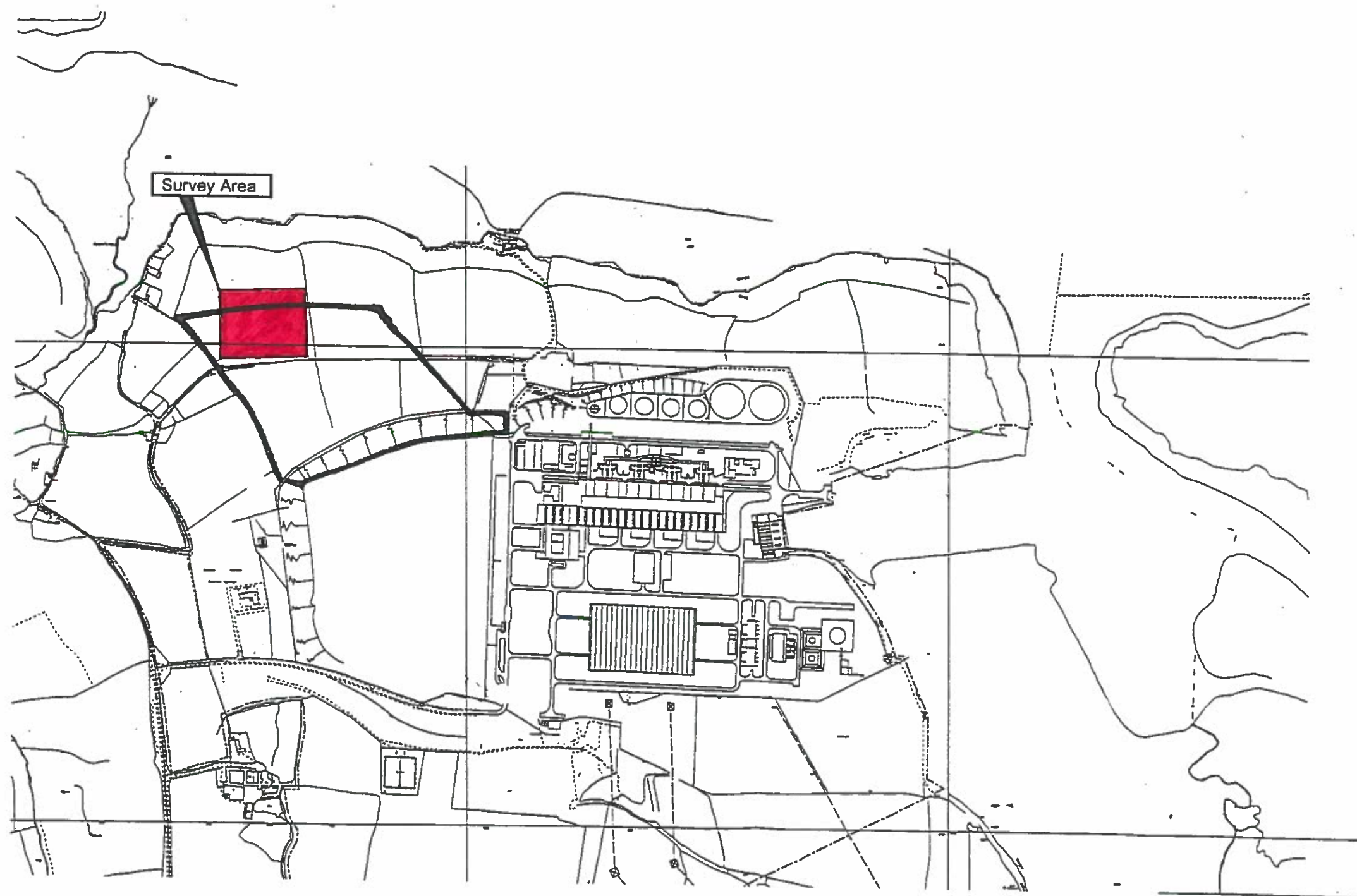
Geophysical Survey
 Pembroke Power Station
 General location plan

Figure 1

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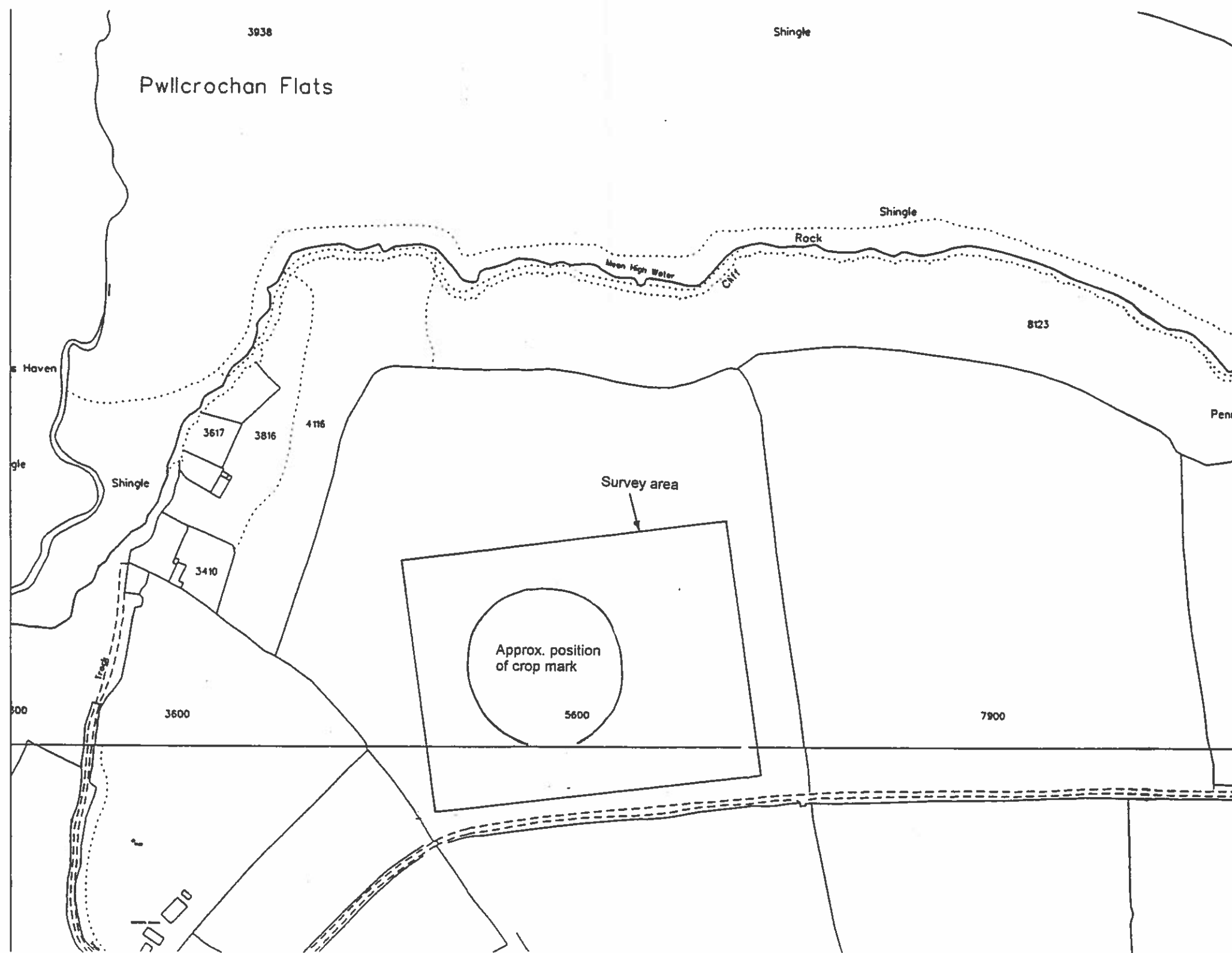
Figure 2

Scale 1:10 000

Subject Geophysical Survey - Pembroke Power Station
Detailed location plan

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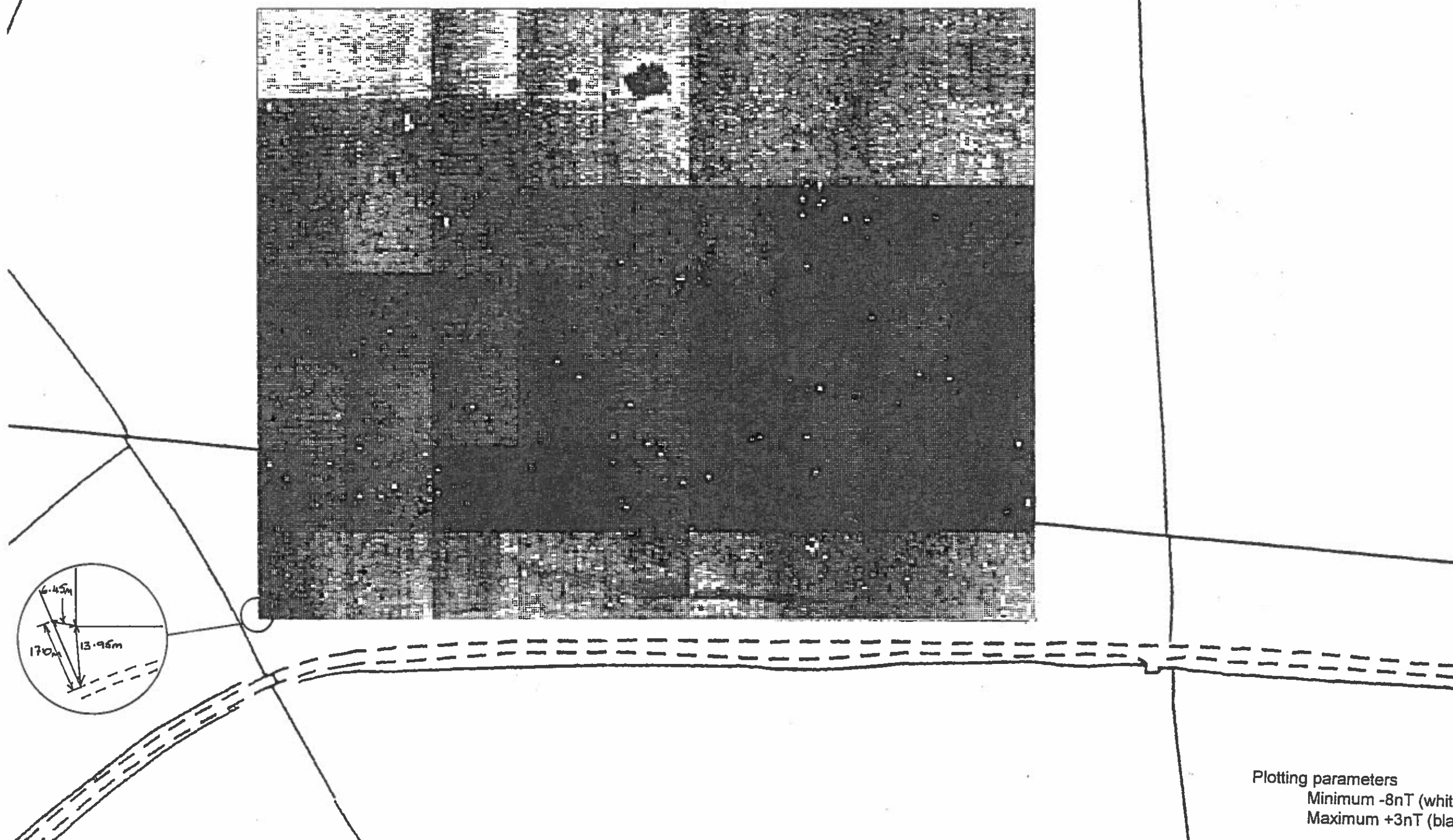
Figure 3

Scale 1:2500

Subject Geophysical Survey - Pembroke Power Station
Plan showing location of crop mark enclosure

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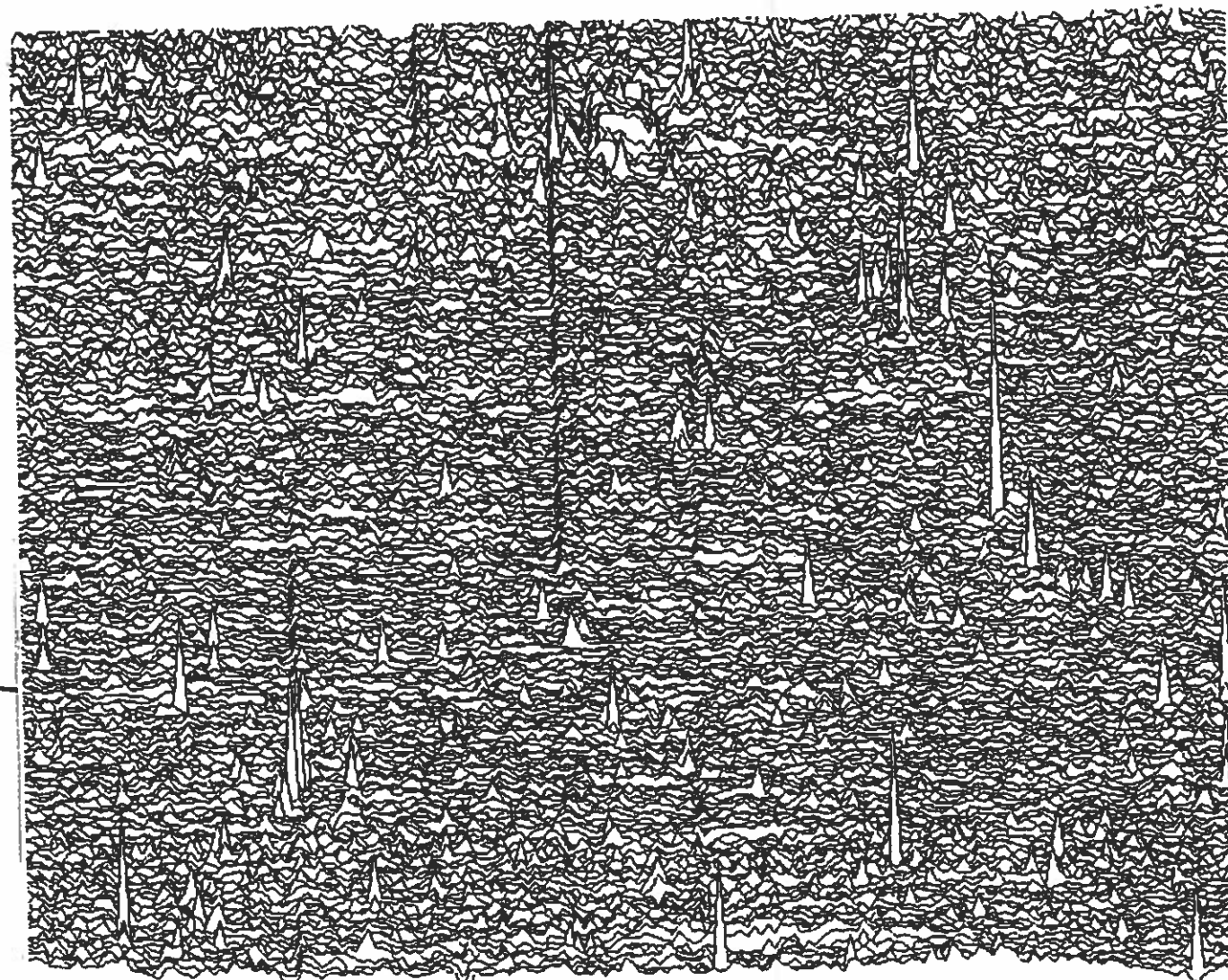
Figure 4

Scale 1:1000

Subject Geophysical Survey - Pembroke Power Station
Plot of raw magnetometer data

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Plotting parameters 20.1nT/cm
Positive readings displace above the trace line
Hidden lines have not been plotted

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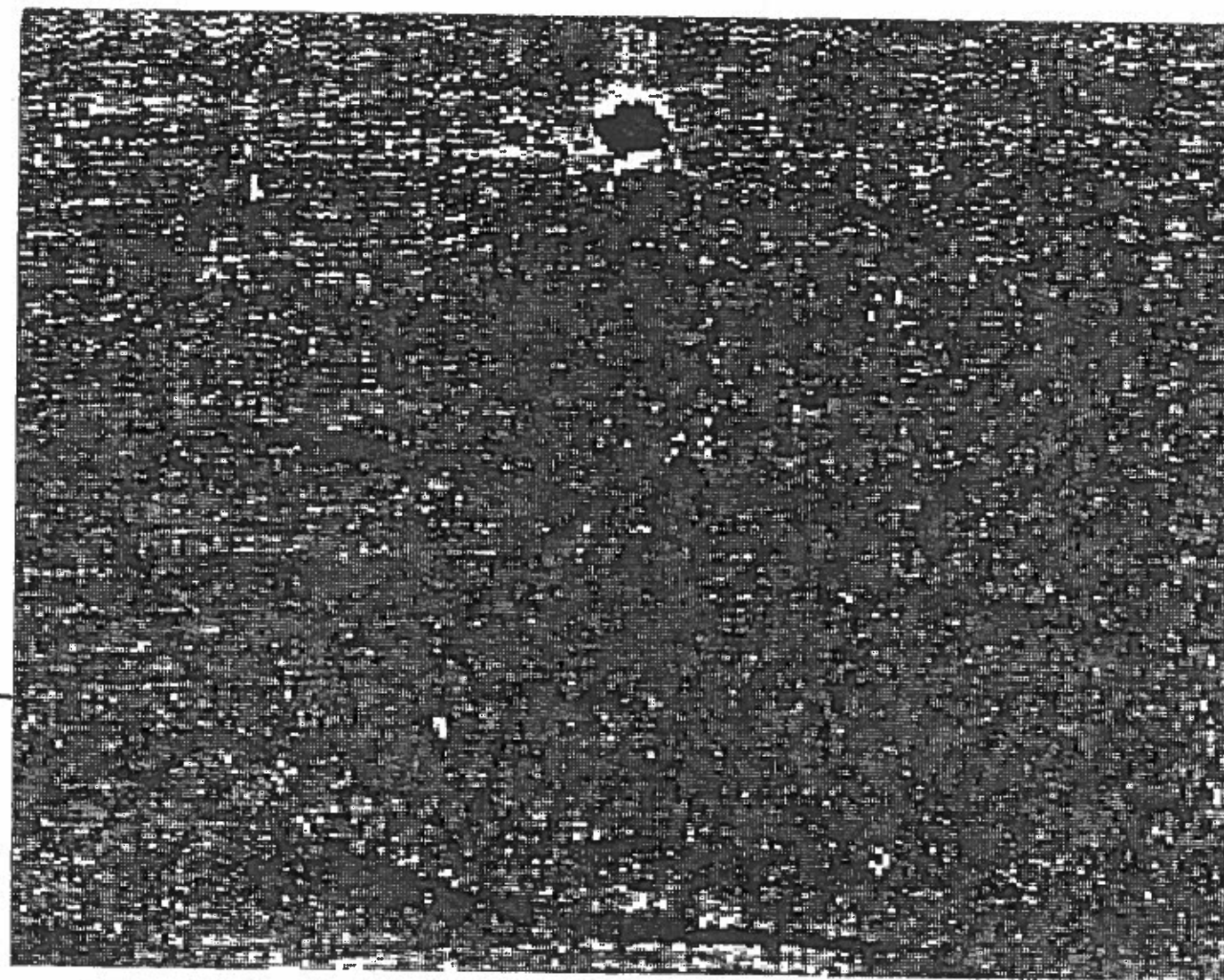
Figure 5

Scale 1:1000

Subject Geophysical Survey - Pembroke Power Station
Trace plot of raw magnetometer data

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Plotting parameters
Minimum -2.5nT (white)
Maximum +2.5nT (black)

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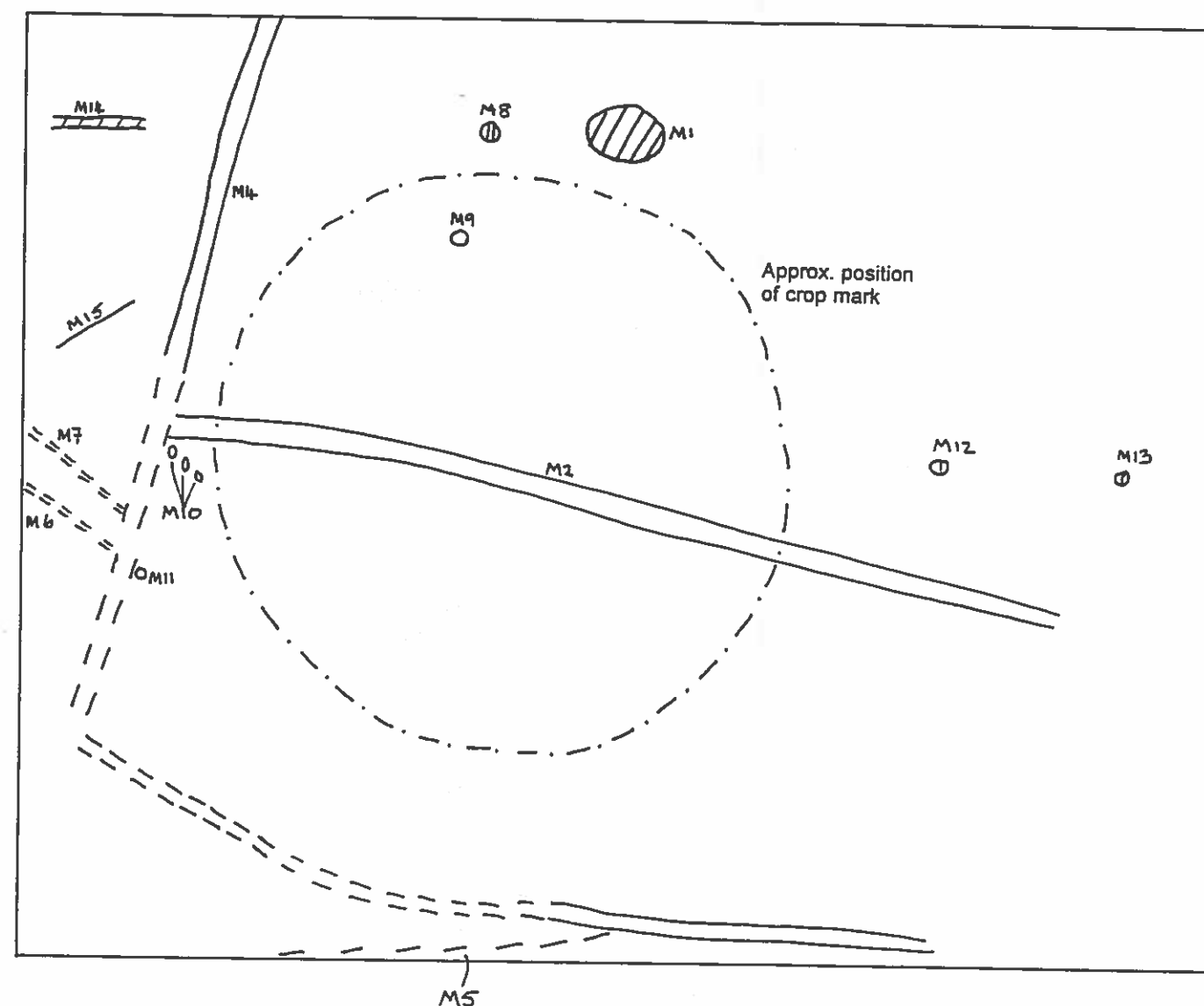
Figure 6

Scale 1:1000

Subject Geophysical Survey - Pembroke Power Station
Plot of processed magnetometer data

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Figure 7

Scale 1:1000

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Abstraction of anomalies

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